Efficient Electrochemical Hydrogen Peroxide Generation in Water, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

An electrochemical cell is proposed for the efficient generation of 3% hydrogen peroxide (H2O2) in pure water using only power, oxygen and water. H2O2 is an attractive biocide for space-based missions, because no harmful chemical residues are produced, yet planktonic, biofilm-forming, and surface microorganisms are effectively controlled using low concentrations. The major hurdle to expanding the use of H2O2 aboard spacecraft has been the absence of an effective H2O2 generator. A new cell design employing new materials will be used to accomplish this goal. First, an innovative conductive polymer cathode will be utilized to form H2O2 efficiently and selectively. Second, a solid polymer electrolyte (SPE) combined with an innovative anode - SPE - cathode design will be utilized to efficiently transfer H+ ions from the anode to cathode, where H2O2 is formed. This approach circumvents problems encountered with previous electrochemical cells designed to produce H2O2. The Phase I will clearly demonstrate the feasibility of these concepts by producing H2O2 in pure water. The Phase II will improve cell efficiency and decrease equivalent system mass (ESM) through cell miniaturization. Long-term performance tests will validate the basic cell design, forming the basis for a multitude of applications in space and commercial markets.

Primary U.S. Work Locations and Key Partners

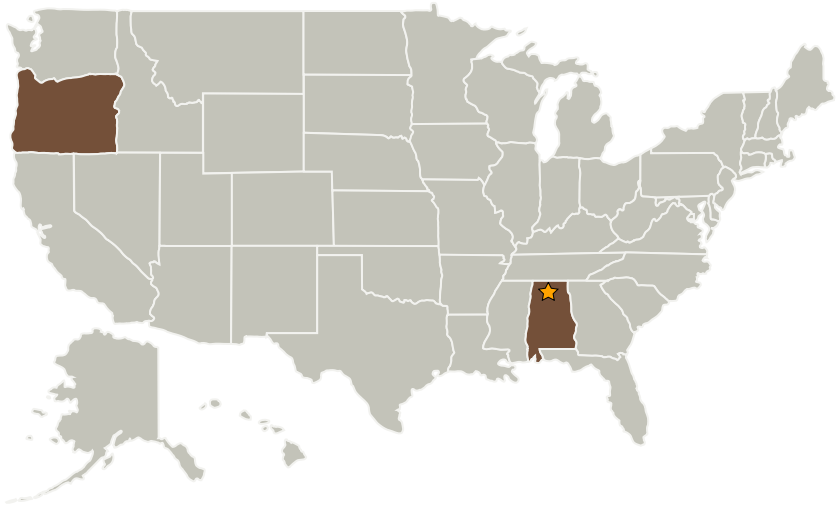

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
UMPQUA Research Company	Supporting Organization	Industry	Myrtle Creek, Oregon

Primary U.S. Work Locations	
Alabama	Oregon

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

James R Akse

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.2 Electrochemical: Fuel Cells